

IMPORTANT

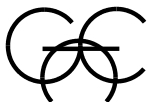
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GEOTECHNICAL, ENVIRONMENTAL & CONSTRUCTION MATERIALS CONSULTANTS

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August 19, 2004

Edward E. Gillen Co.
218 West Becher Street
Milwaukee, Wisconsin 53207

Attention: Mr. Gary Jackson

Subject: Lake Michigan Bluff Stability Analysis
Bender Park
Oakwood Road
Oak Creek, Wisconsin
Project No. 1G-0309022

Dear Mr. Jackson:

The wick drain installation has been started. To date, eight wick drains were installed in the area of the southern bluff study area, and three wick drains installed in the northern study area. Recording of the water levels in the monitoring piezometers has also been conducted on a periodic basis to determine the performance of the wick drains. A table of the recordings is attached.

Wick Installation Information and Comments

The northern study area wick drains were installed first, approximately July 19, 2004. Installation problems were encountered, and resulted in mostly ineffective performance to date. These wicks were installed at the bluff toe location, with a slight upward angle. Due to the soil conditions, refusal to westward penetration into the bluff was encountered at various penetration lengths, less than about 40± feet west of the bluff toe. It is understood from the installation subcontractor that unstable soil conditions were met that did not allow proper directional drilling advancement and wick installation. The bluff toe in the areas of wick installation contain accumulated soils from past slope failures.

The southern study area wick drains were installed and completed by approximately August 4, 2004. The installation was generally more successful than the wick installation in the northern study area. The southern study area wick drains were installed from the top of the bluff at a descending angle and eastward, and with an exit at the bluff toe. The bluff toe in the areas of wick exit contain accumulated soils from past slope failures.

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Directional drilling techniques for installation of dewatering wick drains on the Lake Michigan bluffs in Wisconsin is in an infant stage of knowledge, and therefore considered by Giles to be largely experimental at this time. The installation of the wicks at the toe and from the top of the bluff at the northern and southern study areas respectively were performed under the recommendation of Giles. The northern study area contains less sandy and silty permeable soils at the Giles test boring and piezometer locations, relative to the southern study area. The recommendation to install the wicks at the toe was recommended to determine the wick effectiveness in a less favorable subsurface soil profile condition for wick drainage. Installation at the top of the bluff in the southern study area where more sandy and silty soils were encountered at the test boring and piezometer locations and more favorable conditions for wick drainage exist was recommended because there is more experience with these subsurface conditions and top of bluff installation techniques.

A possible cause or contributing cause of installation problems from the toe area is that the insertion area contains an accumulation of disturbed (softer and less stable) soils from past slope failures. The drilling fluid used is probably less effective in developing borehole stability with these insertion conditions resulting in directional drilling problems and subsequent problems or failures in attempts to install the wick materials. Similar bluff toe conditions exist at the southern study area, but the top to down installation allows for a more effective drilling fluid borehole stabilization.

Records of Water Levels and Comments

The attached table of the piezometer recordings of the water levels indicate lowering of the water levels by an approximate 12 to 15 feet at the southern study area piezometers, with slight if any lowering of the water levels in the northern study area. The recording began in Fall 2003. The effect of the Spring and early Summer 2004 precipitation amounts recorded before wick installation are that the water levels rose about 5 to 6 feet from the levels recorded on December 24, 2003. Visual observation on August 18, 2004 of the wick drain discharges in the southern study area indicate all eight wicks are and were draining free water. Only one of the three wick drains installed in the northern study area appear to be draining water, based on dampness of the wick material, since no free flowing water was present.

The southern area wick drains are considered by Giles to be successfully draining water and therefore improving the bluff stability. The northern study area wick drain installation is considered to be not successful due to the short westward penetration into the bluff. However, a more delayed effect on lowering the water level in the northern study area less permeable soils is expected for the currently installed wicks and for longer or more complete wick drain lengths.

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Recommendations

Installation of additional wick drains in the northern study area is understood to be tentatively planned for next week. Installation from the bluff toe locations is planned. The locations are recommended to be in areas where less to no previously slide failure soils are apparently present. Alternatively, wick installation at the top of the bluff is recommended.

The locations and elevations of all wick drain insertions and discharges are recommended to be obtained and provided to Giles for evaluation. Also, a record of the wick drain pathway elevations and locations below the surface of all of the wick drains is recommended to be obtained and provided to Giles for evaluation.

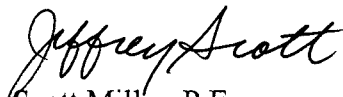
Continued periodic recording of the water level monitoring piezometers by Giles is recommended. This will track the existing and new wick drain performance relative to time and the eventual wetter weather conditions in the future.

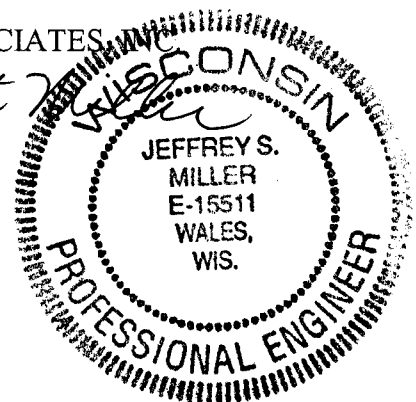
Closure

We appreciate the opportunity to have been of service on this project. If there are any questions or if we may be of further service, please call.

Very truly yours,

GILES ENGINEERING ASSOCIATES, INC.


Jeffrey Scott Miller, P.E.
Sr. Project Manager



Enclosure: Table 1 Piezometer Record

Distribution: Edward E. Gillen Co.
Attention: Mr. Gary Jackson (3)

TABLE 1

**Piezometer Record
Lake Michigan Bluff Stability Analysis
Project No. 1G-0309022**

Piezometer Location	Ground surface Elevation	Piezometer Elevation	Pressure (psi) or Depth (feet)							
			10-2-2003	11-21-2003	12-24-2003	5-18-2004	5-24-2004	7-8-2004	8-4-2004	8-18-2004
PZ 1	697	617	8.01	7.94	8.05	10.12	10.30	10.75	5.45	4.14
PZ 1A	698	638	1.00	3.84	4.15	6.10	6.40	7.05	4.45	2.14
PZ 2	696	621		14.96	14.79	16.80	17.10	17.30	17.60	17.45
PZ 2A	698	648		12.37	13.37	15.60	15.90	15.56	15.25	15.14
STS 1	695		49.00		48.20	46.90	46.70	45.40		
STS 2	695		8.50		12.90	0.50	1.00	2.10		
		Piezometer Location	Water Level Elevation							
			10-2-2003	11-21-2003	12-24-2003	5-18-2004	5-24-2004	7-8-2004	8-4-2004	8-18-2004
		PZ 1	635	635	636	640	641	642	630	627
		PZ 1A	640	647	648	652	653	654	648	643
		PZ 2		656	655	660	660	661	662	661
		PZ 2A		677	679	684	685	684	683	683
		STS 1	646		647	648	648	650		
		STS 2	687		682	695	694	693		

Notes: 5-24-2004 after Spring heavy rainfalls
7-8-2004 one week prior to wick installation
8-4-2004 wick installation completed